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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 14 FEB 2005

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|--|---|--|-----------------------|---|---------------------|-------------------------------------|----------|--------------------------------------|--|-------------------------------------|----------------------------|---|---|-------------------------------------|-------------------------|--------------------------------------|--|---------------------------------------|---|
| Applicant's or agent's file reference 7512.175 | FOR FURTHER ACTION | | See Form PCT/IPEA/416 | | | | | | | | | | | | | | | | |
| International application No. PCT/US04/03878 | International filing date (day/month/year) 11 February 2004 (11.02.2004) | Priority date (day/month/year) 12 February 2003 (12.02.2003) | | | | | | | | | | | | | | | | | |
| International Patent Classification (IPC) or national classification and IPC IPC(7): C25D15/00, 9/00, 11/00, 9/02; B32B 9/04 and US Cl.: 205/109, 316, 317, 318; 428/411.1 | | | | | | | | | | | | | | | | | | | |
| Applicant UNIVERSITY OF MARYLAND COLLEGE PARK | | | | | | | | | | | | | | | | | | | |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of ___ sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/> Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/> Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/> Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/> Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/> Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/> Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/> Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/> Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> | | | | <input checked="" type="checkbox"/> Box No. I | Basis of the report | <input type="checkbox"/> Box No. II | Priority | <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> Box No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input type="checkbox"/> Box No. VI | Certain documents cited | <input type="checkbox"/> Box No. VII | Certain defects in the international application | <input type="checkbox"/> Box No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/> Box No. I | Basis of the report | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. II | Priority | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. IV | Lack of unity of invention | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. VI | Certain documents cited | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Box No. VIII | Certain observations on the international application | | | | | | | | | | | | | | | | | | |
| Date of submission of the demand 13 September 2004 (13.09.2004) | | Date of completion of this report 03 February 2005 (03.02.2005) | | | | | | | | | | | | | | | | | |
| Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230 | | Authorized officer Harry D Wilkins, III Jean Proctor Paralegal Specialist Telephone No. 571-272-1700 | | | | | | | | | | | | | | | | | |

Form PCT/IPEA/409 (cover sheet)(January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/03878

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☒ the international application as originally filed/furnished

☒ the description:

pages 1-60 as originally filed/furnished

pages* NONE received by this Authority on _____

pages* NONE received by this Authority on _____

☒ the claims:

pages 61-67 as originally filed/furnished

pages* NONE as amended (together with any statement) under Article 19

pages* NONE received by this Authority on _____

pages* NONE received by this Authority on _____

☒ the drawings:

pages 1-4 as originally filed/furnished

pages* NONE received by this Authority on _____

pages* NONE received by this Authority on _____

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (*specify*): _____

☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (*specify*): _____

☐ any table(s) related to the sequence listing (*specify*): _____

** If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US04/03878**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

| | | |
|-------------------------------|--|-----|
| Novelty (N) | Claims <u>2-7, 14-23, 26, 28, 29 and 31-43</u> | YES |
| | Claims <u>1, 8-13, 24, 25, 27 and 30</u> | NO |
| Inventive Step (IS) | Claims <u>2-7, 14-23, 26, 28, 29 and 31-43</u> | YES |
| | Claims <u>1, 8-13, 24, 25, 27 and 30</u> | NO |
| Industrial Applicability (IA) | Claims <u>1-43</u> | YES |
| | Claims <u>NONE</u> | NO |

2. Citations and Explanations (Rule 70.7)

Claims 1, 8-13, 24, 25, 27 and 30 lack novelty under PCT Article 33(2) as being anticipated by Redepenning (US 2002/0084194 A1). Redepenning teaches (see claim 20) a method for electrochemically depositing a polysaccharide having a selected physical state including providing a substrate (cathode), contacting the substrate with an aqueous solution comprising a selectively insolubilizable polysaccharide (chitosan) and electrochemically depositing the polysaccharide while controlling deposition conditions to control the physical state. Regarding claim 12, Redepenning teaches (see claim 35) further treating the depositing coating with a basic solution. Regarding claim 24, Redepenning teaches (see claim 35) coupling the chitosan molecules to hydroxyapatite. Regarding claim 27, Redepenning teaches (see claim 25) using a current density of 10 A/m² to 10000 A/m², thus overlapping the presently claimed range at 10-100 A/m². Regarding claim 30, the coupling of the chitosan to hydroxyapatite occurs after electrochemically depositing the chitosan.

Claims 2-7, 14-23, 26, 28-29 and 31-43 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest (i) claims 2-7, 22-23, 26, 28 and 39-43, that the selected physical state is a hydrogel; (ii) claims 14-15, an ionizable group comprising one of the selected types; (iii) claim 16, treating the polysaccharide with an acidic solution; (iv) claims 17-18, using a non-conducting material as the substrate; (v) claim 19, utilizing gold; (vi) claims 20-21, using a patterned substrate; (vii) claim 29, coupling a molecule to the chitosan (polysaccharide) before electrochemically depositing the chitosan (polysaccharide); and, (viii) claims 31-38, none of these features including modifying the polysaccharide to improve conjugatability or to couple the polysaccharide with other molecules.

Claims 1-43 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

----- NEW CITATIONS -----

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/03878

Supplemental Box Relating to Sequence Listing

Continuation of Box No. I, item 2:

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion was established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed
☐ filed together with the international application in computer readable form
☐ furnished subsequently to this Authority for the purposes of search and/or examination
☐ received by this Authority as an amendment* on _____

2. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

* If item 4 in Box No. I applies, the listing and/or table(s) related thereto, which form part of the basis of the report, may be marked "superseded."